

PATENT SPECIFICATION

DRAWINGS ATTACHED.

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COMPLETE SPECIFICATION.

Improvements in and relating to Projection Lamps of the kind having a Flattened Light Output Window.

We, PHILIPS ELECTRONIC AND ASSOCIATED INDUSTRIES LIMITED, of Abacus House, 33 Gutter Lane, London, E.C.2, a British Company, do hereby declare the invention, for 5 which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

The invention relates to an incandescent 10 lamp for projection purposes, having a partly reflecting glass bulb, which is provided on one of its sides with a flattened wall portion, which is formed at least partly by a light output window, which terminates 15 at a sharp boundary line in the surrounding bulb wall portion, which lamp is furthermore provided with a domed extension located opposite the foot of the lamp.

The use of such a projection lamp permits of obtaining a very compact structure 20 of projection apparatus. The mirror bulb wall portions may be shaped in a form such that the reflected light forms a converging beam, the focal plane being located outside the bulb in the immediate proximity of the 25 film window of the projection apparatus concerned. There is no need for using a reflector nor a lens separated from the lamp and operating as a condenser. The flattened part of the bulb permits, in particular, of arranging the film window very close to the lamp or the flattened part provides greater space for accommodating optical expedients such as filters.

35 The flattening of the bulb wall portion comprising the light output window and the sharp boundary line between this flattened wall portion and the surrounding bulb wall portion therefore improves the optical efficiency of the lamp. The mirror wall portion of the bulb located directly beyond the sharp boundary line may have an accurately de-

fined reflecting effect substantially throughout its surface. In practice, however, the flattening of the wall portion with the window is found to render the manufacture of the bulb very difficult. The flattening and the sharp line of demarcation in the bulb wall portion having the light window, render the bulb mechanically fairly weak. Owing 45 to the mechanical stress produced by pumping during the manufacture or owing to temperature stress during use of the lamp, the bulb is likely to break down prematurely if no special structural measures are taken. The said transition might be shaped more gradually, but this reduces the optical efficiency of the lamp. A greater quantity 50 of glass might be used to manufacture the bulb so that the walls would be thicker and hence more rigid. On a first approximation this measure does not seem to be very attractive, since it is common practice to arrange the mould for blowing the bulb in such a position that the domed extension hangs down. Consequently, a large part of the greater quantity of glass will collect in 55 said extension. The bulb will thus have fairly thin and fairly thick wall portions, especially at the window and in the domed extension. Already during manufacture or subsequently during the use of the lamp these differences in thickness readily give rise to thermal stress leading to break-down 60 of the bulb.

75 Experiments have surprisingly shown that nevertheless a stable bulb structure with flattened window can be obtained, if the degree of flattening of the window and the ratio between the thicknesses of the window and the dome are held within very accurately defined limits. Thus can be achieved in practice by a suitable choice of the working temperature of the glass portion for blow-

ing the bulb. By using the bulb proportions to be described hereinafter, the advantage of the flattened bulb portion and of the sharp boundary line is maintained, whilst the risk of break-down of the bulb due to this boundary line and an unfavourable ratio between the wall thicknesses is avoided.

A projection lamp of the kind set forth is characterized in accordance with the invention, in that with a maximum power consumption of the lamp of 200 W, the greatest distance of the outer surface of the bulb wall portion with the light output window from the plane going through the sharp boundary line is greater than 0.015 times and smaller than 0.055 times the distance between the two most widely separated points of the circumference of said boundary line and in that the ratio between the maximum wall thickness of the domed extension and the smallest wall thickness of the light output window is greater than 2.5 and smaller than 10.

The invention will be described more fully with reference to the accompanying diagrammatic drawing in which:

Figure 1 is a side elevation of one advantageous embodiment of an incandescent lamp according to the invention, in which the glass bulb is shown partly in a sectional view for the sake of clarity.

Figure 2 is a sectional view on an enlarged scale part of the bulb wall having the light output window.

The lamp comprises a glass bulb fastened in a conventional manner to the lamp foot 1; in this construction the wall portions 2-3-4 and 2-5-6 are, at least at their outer surfaces, parts of an ellipsoid and of a sphere respectively. The major axis of the ellipsoid and a centre line of the sphere coincide and form a line X-X transverse of the longitudinal axis of the lamp, on which line is located a focus of the ellipsoid coinciding with the centre of the sphere. Near this point 9 there is located the squat incandescent body 10 consisting of a wire wound in the form of a single helix and fastened in a conventional manner with its current supply wires 11 in the pinch of the base 12 of the lamp. On the front side the bulb is flattened over the wall portion 6-7-6 and is provided with the domed extension 3-8-5 on the side opposite the base. With the exception of the flattened wall portion 6-7-6, which forms the light output window and terminates at the edge 6 via a sharp boundary line in the surrounding bulb wall portion, the bulb is provided on the outer side, at least beyond the base 1, with a mirror layer 13.

The outer surface of the flattened wall portion 6-7-6 is spaced apart from the plane V going through the boundary line 6 by a

maximum distance a indicated in Figure 2. In the embodiment shown the edge 6 is a circle. Therefore the distance A between the two most widely separated points of said edge is in this case equal to the diameter of the circle. The maximum wall thickness of the domed extension is indicated in Figure 1 by D and the minimum wall thickness of the light output window is indicated in Figures 1 and 2 by d.

According to the present invention a stable bulb structure with a flattened window can be obtained by choosing the ratio between a and A to be greater than 0.015 and smaller than 0.055, whilst the ratio between D and d should be greater than 2.5 and smaller than 10. In this way, the advantage of the flattened part of the bulb wall and of the sharp boundary line 6 is maintained, whilst the risk of break-down of the bulb due to said boundary line and to an unfavourable ratio between the wall thicknesses is avoided.

In a practical embodiment the power consumption of the lamp was 50 W, the ratio between a and A was equal to 0.021 and the ratio between D and d was equal to 4.1.

WHAT WE CLAIM IS:—

1. An electric incandescent lamp for projection purposes, having a partly reflective glass bulb, which is provided on one of its sides with a flattened portion forming at least partly a light output window, which terminates at a sharp boundary line in the surrounding bulb wall portion, whilst the bulb is furthermore provided with a domed extension located opposite the lamp press, wherein with a maximum power consumption of the lamp of 200 W the maximum distance of the outer surface of the bulb wall portion with the light output window from the plane going through the sharp boundary line is greater than 0.015 times and smaller than 0.055 times the distance between the two most widely separated points of the circumference of said boundary line and in that the ratio between the maximum wall thickness of the domed extension and the minimum wall thickness of the light output window is greater than 2.5 and smaller than 10.

2. An electric incandescent lamp substantially as herein described with reference to the accompanying drawings.

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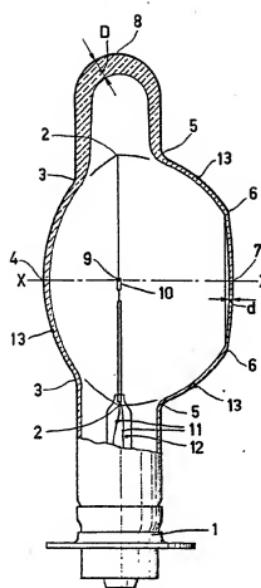


FIG. 1

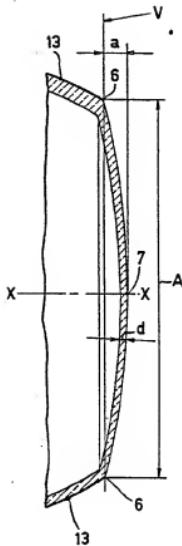


FIG. 2